SurveyMotion: What Can We Learn From Sensor Data About Respondents' Actions in Mobile Web Surveys?

The passive collection of sensor data can be used to observe respondents' actions in mobile web surveys and to draw conclusions about the completion conditions. We propose "SurveyMotion (SM)," a JavaScript-based paradata tool. SM enables surveyors to gather the total acceleration (TA) of respondents' mobile devices.
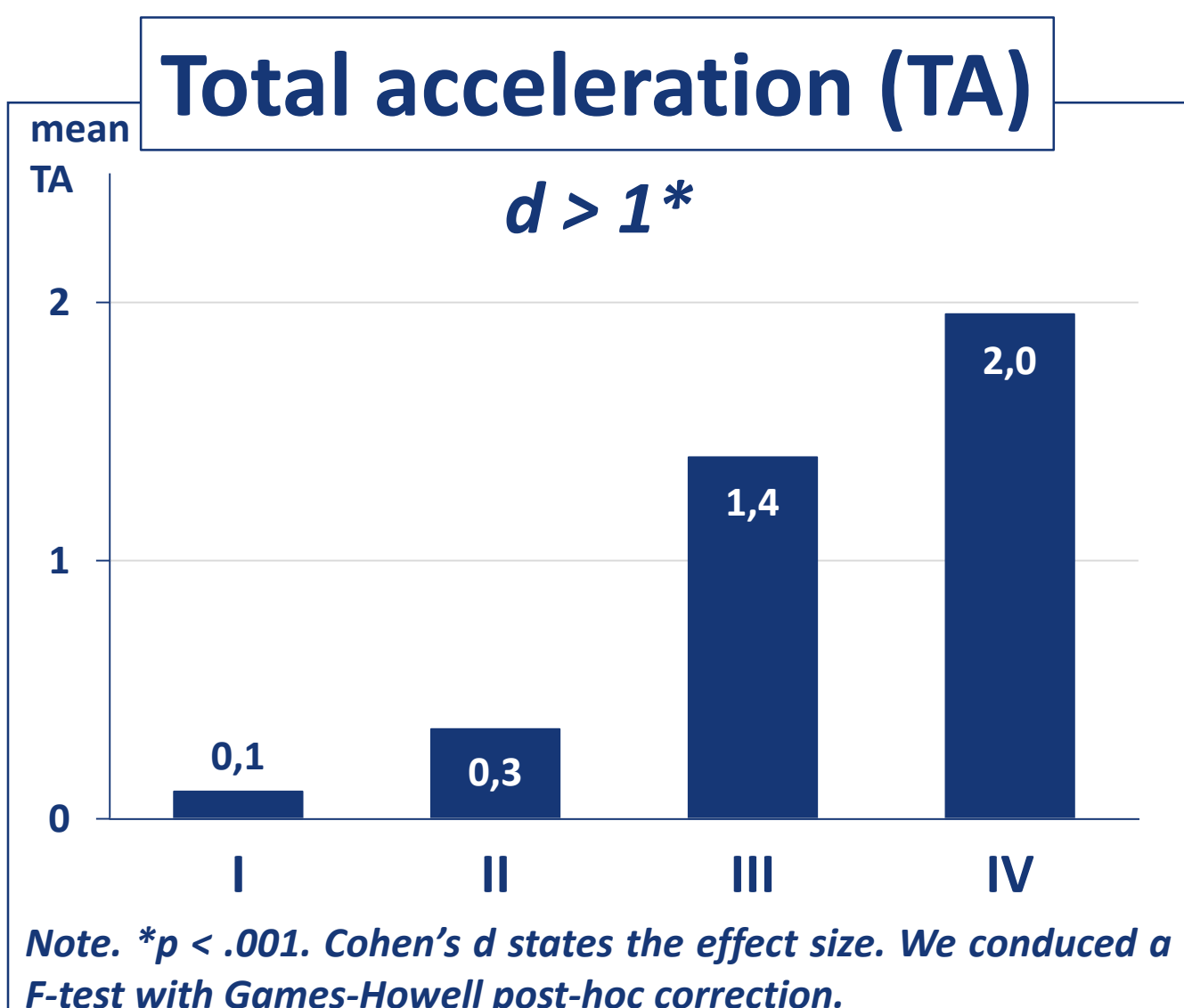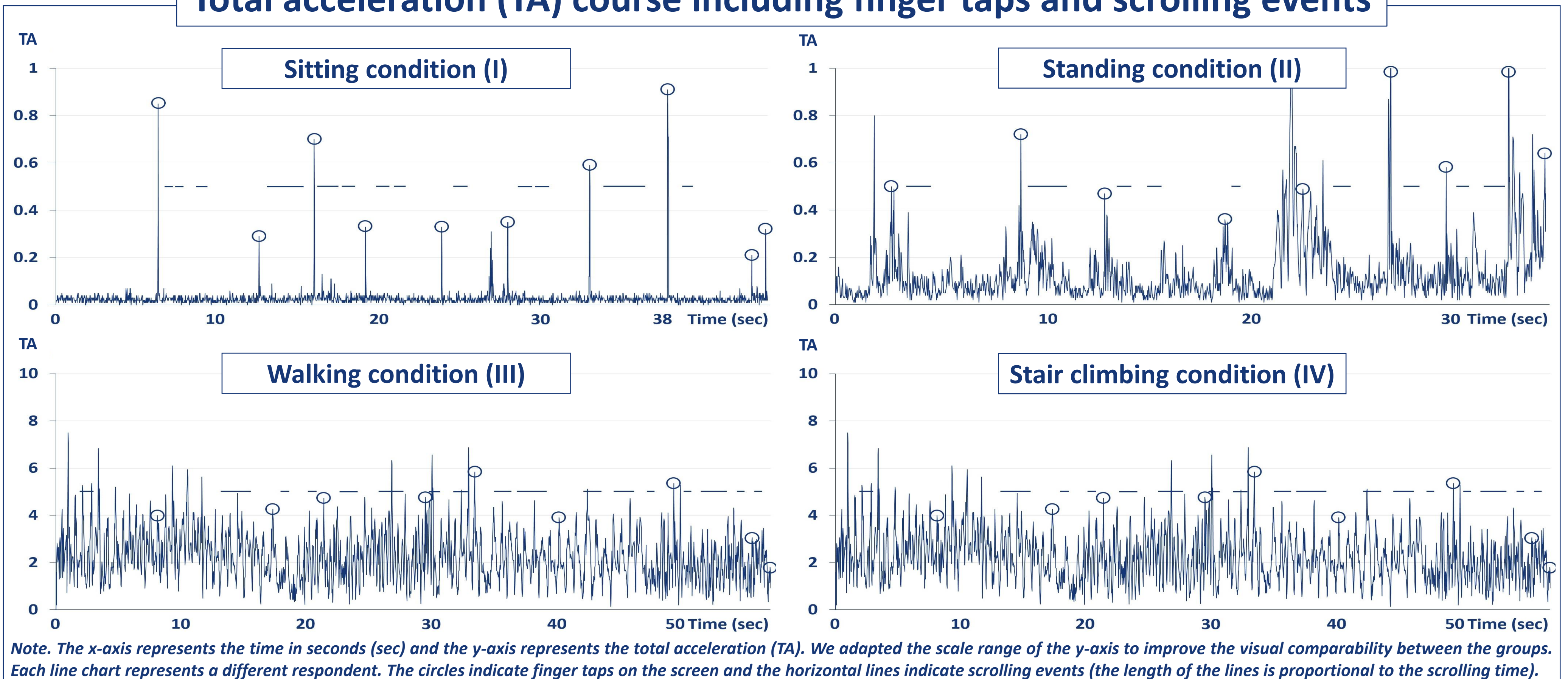
Imagine a Cartesian coordinate system with three dimensions: In this system, movements can be described as motion on an x-, y-, and z-axis. The International System unit for acceleration (a) is meter per second squared (m/s²). The total acceleration (TA) is defined as follows:
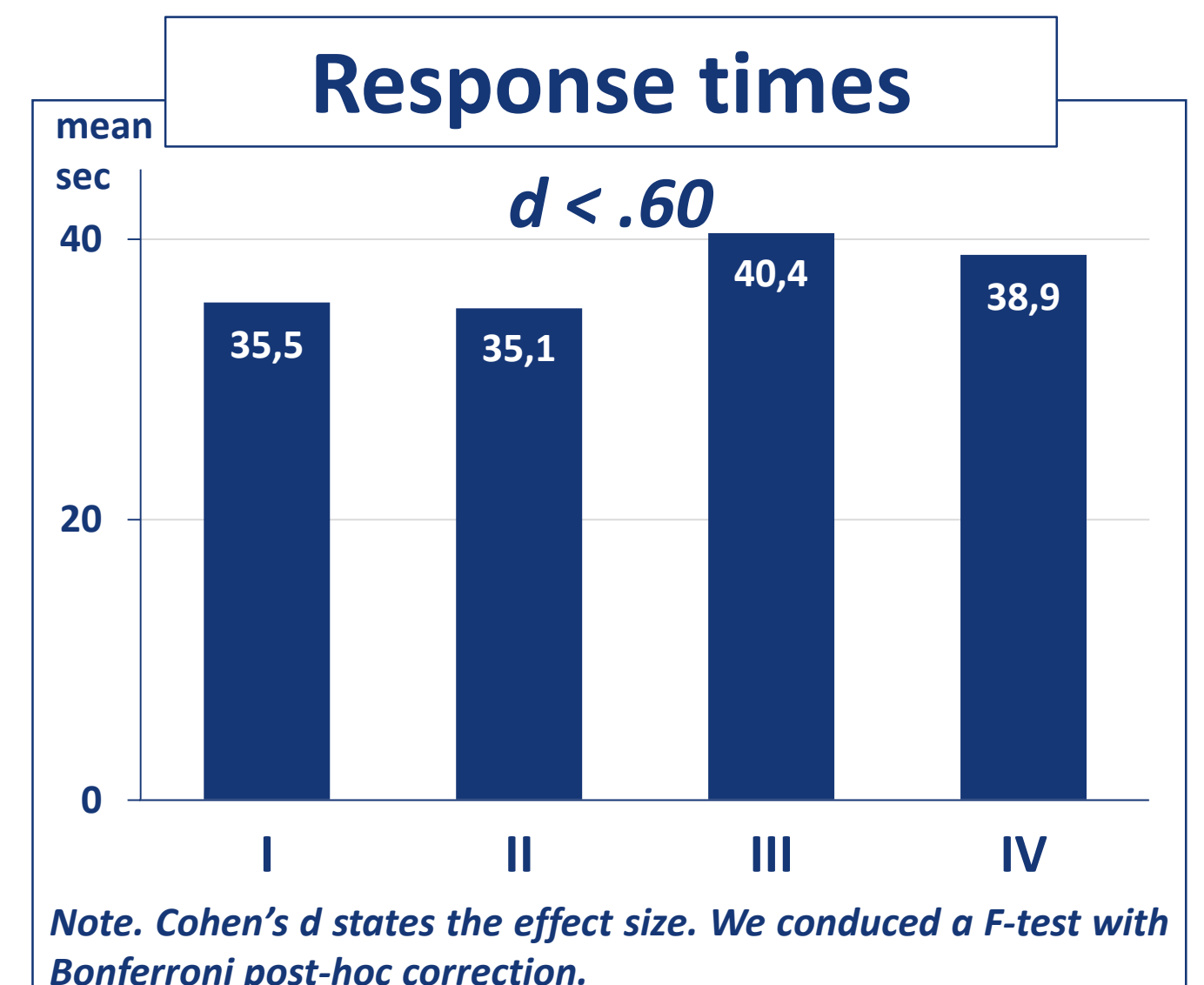
$$TA = \sqrt{a_x^2 + a_y^2 + a_z^2}$$

We conducted a lab experiment and varied the completion condition: (I) sitting, (II) standing, (III) walking, and (IV) stair climbing. We tested 8 questions (item-by-item). In total, 120 persons took part by using their own device. Also, we collected several types of paradata (e.g., scrolling).

Total acceleration (TA) course including finger taps and scrolling events

Note. The x-axis represents the time in seconds (sec) and the y-axis represents the total acceleration (TA). We adapted the scale range of the y-axis to improve the visual comparability between the groups. Each line chart represents a different respondent. The circles indicate finger taps on the screen and the horizontal lines indicate scrolling events (the length of the lines is proportional to the scrolling time).

Total acceleration (TA)

*Note. *p < .001. Cohen's d states the effect size. We conduced a F-test with Games-Howell post-hoc correction.*

Motion levels manifest themselves in the total acceleration (TA) of smartphones. Hence, it seems that respondents can be distinguished on the basis of their motions.

Response times do not differ between the motion conditions. Hence, there is no supporting evidence for a connection between motion levels and response times.

Response times

Note. Cohen's d states the effect size. We conduced a F-test with Bonferroni post-hoc correction.

This experimental study provides supporting evidence for a respondent-device link. Sensor data might be advantageous for mobile web surveys by allowing to investigate completion conditions.

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